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(54) Steering lock for a bicycle

(57) A steering lock 1 for a bicycle has a barrel housing 3 for receiving a lock barrel with a detent bolt 5 and a key 6, the barrel housing 3 being connected against rotation to a steering head tube 14 secured to the bicycle frame. The bolt 5 can be engaged in a bolt-receiving opening, 9, two of which may be provided, in a stop sleeve 7 which is connected against rotation to a fork tube 13 of the bicycle. The barrel housing 3 is rigidly connected through a welding pedestal 3a to a lock housing 2, a stop collar 4 integral with the welding pedestal passing through the lock housing radially inwardly, whereby two stops 8 in the stop sleeve 7 co-operate with the stop collar 4 for defining the end stops of the steering arrangement. The steering mechanism can may be locked in each end position of the steering, which can be advantageous in parking the bicycle.

Fig. 1

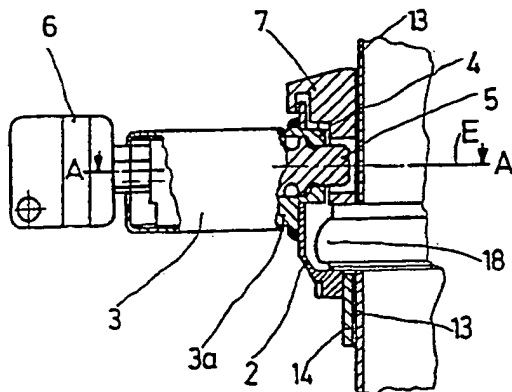
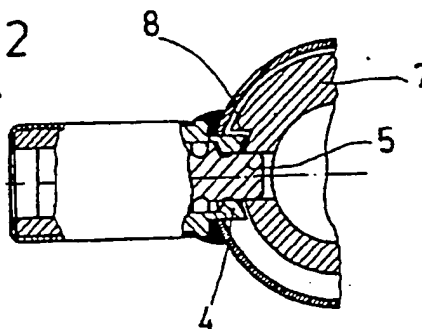


Fig. 2  
A-A



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Fig. 1

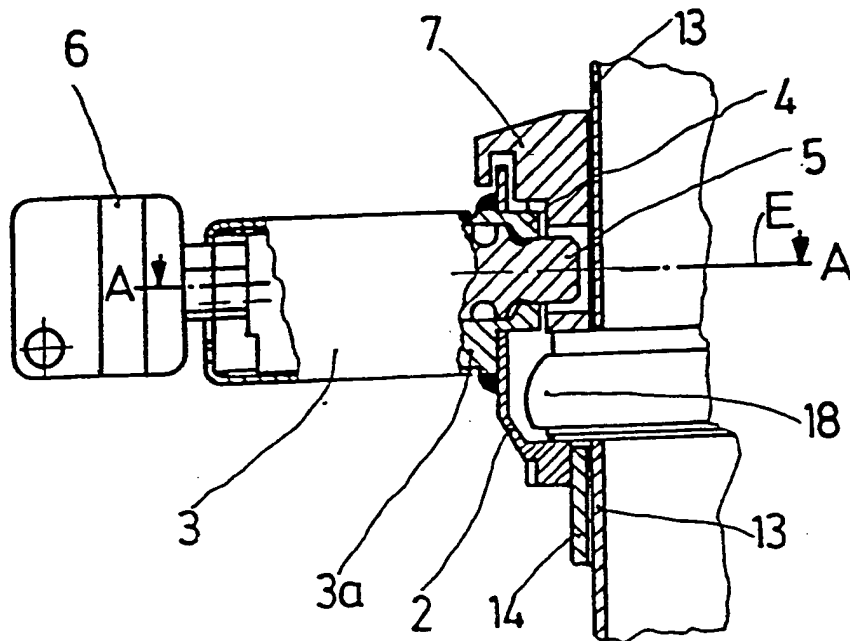


Fig. 2  
A-A

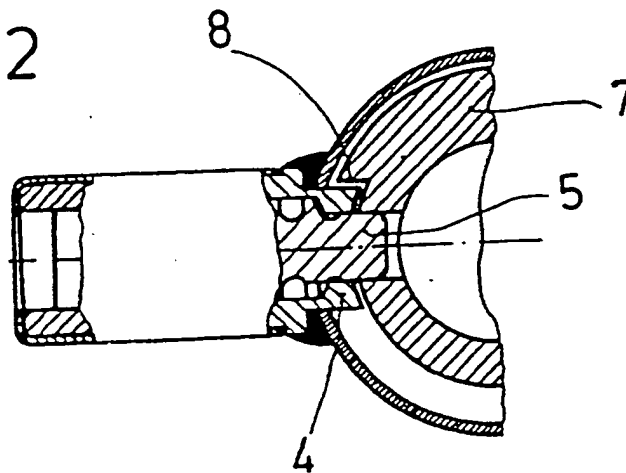


Fig. 3

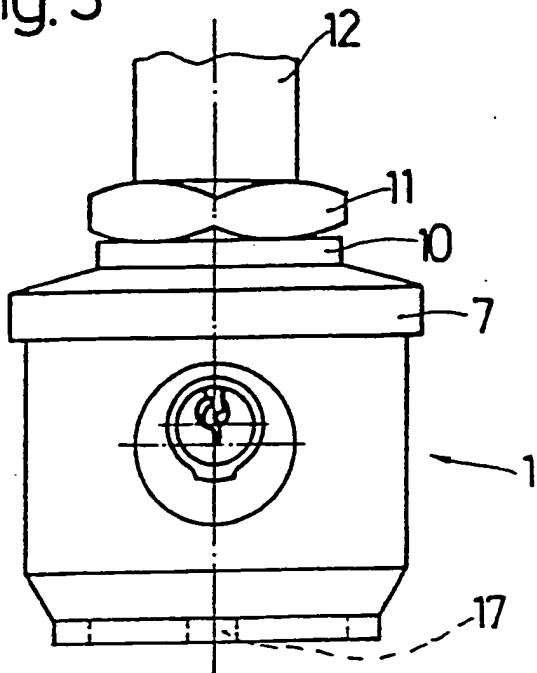


Fig. 4

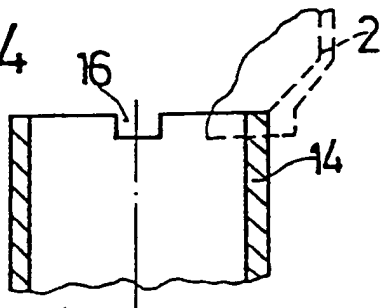


Fig. 5

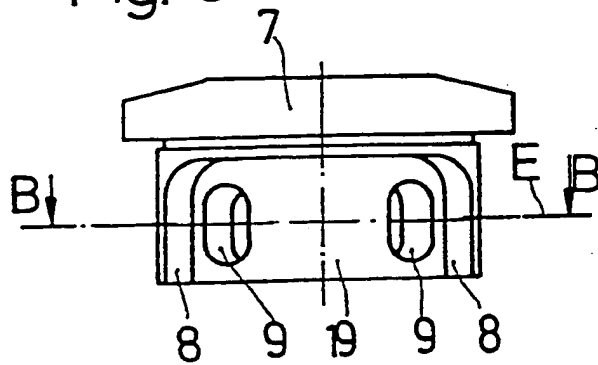
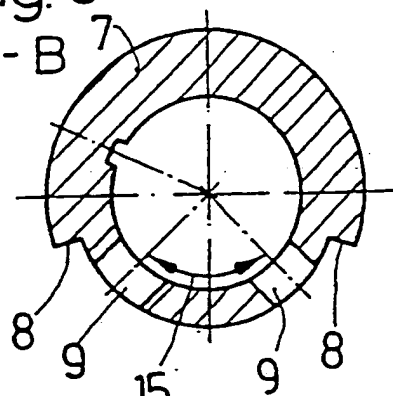


Fig. 6

B - B



STEERING LOCK FOR A BICYCLE

The invention relates to a steering lock for a bicycle of the kind having a frame to which is rigidly attached a steering head tube connecting the steering to a fork tube, the lock comprising a barrel housing for receiving a locking barrel having a detent bolt operated by a key, the barrel housing being connected to the steering head tube against relative rotation, and the detent bolt being adapted for engagement in a bolt-receiving opening in a rigid component connected to the fork tube against relative rotation.

Steering locks of the kind set forth on two-wheeled vehicle are known in the form in which the barrel housing is welded to the steering head tube and the bolt, which is operated from outside by the key, enters a bore in the rigid component of the fork tube, which is connected to the fork of the bicycle. The fork tubes in bicycles have thin walls and are not able, without reinforcement, to co-operate with the bolt. As the fork tube is of fixed inside and outside diameter, the rigid component must be used to handle the forces which arise on the bolt on turning of the steering head. Furthermore, in the event of damage repairs can generally not be carried out without replacing important parts of the steering assembly.

A further requirement for bicycles is to provide stops for limiting steering movement in both directions. This is particularly useful in bicycles which are supported on side stands as they generally fall over when the front wheel is turned to the rear by external influences, for example by inadvertent contact. It has been found that a bicycle is not

adversely affected in its movement in use as long as the steering movement is not less than 90°.

According to the present invention, in a steering lock for a bicycle of the kind set forth, the barrel housing is connected rigidly to a lock housing mounted on the steering head tube against relative rotation, and the rigid component connected to the fork tube comprises a stop sleeve, the barrel housing having an integral stop collar of which each of a pair of lateral surfaces lying in a plane perpendicular to the axis of the steering head tube co-operates with a respective stop formed by the end of a circumferential groove in the stop sleeve.

Thus the rigid component in the form of the stop sleeve not only handles the forces arising on the detent bolt, but also provides the stops for limiting the steering movement in each direction.

Conveniently, the barrel housing is connected to the lock housing by a welding pedestal, with which the stop collar is integrally formed.

Preferably the detent bolt is co-axial with the locking barrel and passes through the stop collar, with at least one bolt-receiving opening being provided in the circumferential groove in the stop collar. This provides a simple construction.

It is advantageous if the detent bolt comes into alignment with a bolt-receiving opening when the stop collar is in contact with either stop. This allows the steering lock to be actuated to hold the steering in each of the extreme positions, which can be

advantageous in parking the bicycle, as better use can be made of parking spaces.

Preferably two bolt-receiving holes in the stop sleeve are directed radially, and the angle between them corresponds to the desired steering range of the bicycle. The angle preferably lies in a range between  $70^{\circ}$  and  $120^{\circ}$ .

Conveniently an upper steering head bearing is integrated into the steering lock, and is adjusted with the steering lock on assembly. The upper steering head bearing may be a shoulder bearing, and on assembly its clearance is set and it is then locked by means of a nut and support washer connected to the fork tube against relative rotation.

In order to simplify assembly, the lock housing is located round the steering head tube, with at least one radially inwardly extending projection on the lock housing engaging in a corresponding receiving groove on the end of the steering head tube, such that the axial overlap between the steering head tube and the lock housing limits the axial depth of the receiving groove on the end of the steering head tube.

It is also possible, using the invention, to use bicycle frames which have been manufactured for receiving the steering lock on bicycles which are not to be equipped with the steering lock.

In the event of damage the steering lock as well as the more important components of the lock can be replaced, which can have a favourable effect on the costs of repair.

An embodiment of the invention by way of example is illustrated in the accompanying drawings, in which:-

Figure 1 shows in partial section the assembly of a bicycle steering lock, with a steering housing, a barrel housing, a detent bolt and a key;

Figure 2 is a section along the line A-A of Figure 1;

Figure 3 shows the steering lock looking along the axis of the barrel housing;

Figure 4 shows in longitudinal section a steering head tube;

Figure 5 shows a stop sleeve with a circumferential groove and two bolt-receiving openings; and

Figure 6 is a section along the line B-B of Figure 5.

The Figures show a steering lock for a bicycle. The lock 1 comprises a lock housing 2 which is connected secure against relative rotation to a steering head tube 14 secured to the bicycle frame, a barrel housing 3 with a welding pedestal 3a, a detent bolt 5, and a rigid stop sleeve 7 which is connected to be secure against relative rotation to a fork tube 13 of the bicycle. The welding pedestal 31 is welded to the lock housing 2 in such a way that it forms a stop collar 4 projecting beyond the surface of the lock housing 2 and forming a raised cylindrical region on the inner surface of the lock housing 2. The detent bolt 5 is arranged slidably in a central bore in this

cylindrical raised portion in such a way that it can be displaced radially relative to the steering head tube 14 when the user turns a key 6, whereby a lock barrel arranged in the barrel housing 3 causes displacement of the bolt.

The steering lock 1 has the fork tube 13 passing through it, the stop sleeve 7 being arranged to be non-rotational but axially displaceable on the fork tube 13.

The stop sleeve 7 is shown in detail in Figure 6, which shows a section through a plane E perpendicular to its longitudinal axis. The stop sleeve 7 has two bolt-receiving openings 9 and two stops 8. The stops 8 are defined by the ends of a circumferential groove 19 which reduces the wall thickness of the sleeve 7 and receives the stop collar 4 when the steering lock 1 is assembled. The stop collar 4 has a pair of lateral surfaces, and each of these co-operates with a corresponding stop 8 on rotation of the steering device which is connected through a steering tube 12 to the fork tube 13 in the steering head, in the region of the plane E. The stop collar 4 and stop sleeve 7 are arranged in relation to one another so that when the steering device reaches the end of its movement (apart from angular play or clearance) the bolt 5 lies substantially opposite a bolt-receiving opening 9 and can be caused to engage in it by the use of an actuating movement on the key 6.

Figure 6 also shows how the positions of the two bolt-receiving holes 9 lie at an angle of about  $90^\circ$  to one another. This angle also corresponds to approximately the overall steering travel of the bicycle as in these two positions the stops 8 come up



against the outside diameter of the stop collar 4 and prevent further rotational movement of the steering.

The steering lock 1 also encloses an upper steering head bearing 18 which is in the form of a shoulder bearing. This is adjusted in the usual way in co-operation with a lower steering head bearing (not shown) by clamping the bearing shells and is secured by a nut 11 (see Figure 3). There is in fact a series of components clamped in this way, including the stop sleeve 7, as shown in Figures 1 and 3. An abutment washer 10 is connected to be secure against rotation but axially displaceable in relation to the fork tube 13, which simplifies the adjustment step in that on rotation of nut 11, none of the components which are to be adjusted can rotate with it, so that they do not require holding or make the adjustment more difficult.

The adjustment described above by clamping the stop sleeve 7 and the upper steering head bearing 18 with the lower steering head bearing results in a thrust force through the steering head tube 14, to which the lock housing 2 of the steering lock 1 is subjected. As can be seen in Figures 1 and 4, the lock housing 2 locates itself on the outside diameter of the steering head tube 14 and in the assembled condition it is secured against rotation by a radially inward projection 17 in the lock housing 2, this projection 17 engaging in a co-operating groove 16 on the face of the steering head tube 14. The depth of the groove limits the axial travel of the lock housing 2 when it is assembled on the steering head tube 14, the lock housing 2 of the steering lock 1 being pressed axially against the end face of the steering head tube 14, by screwing on the upper shell of the upper steering head bearing 18 over the lower shell of this bearing. When

the tolerances have been taken up by this adjustment operation, the nut 11 is tightened.

CLAIMS

1. A steering lock for a bicycle of the kind set forth, in which the barrel housing is connected rigidly to a lock housing mounted on the steering head tube against relative rotation, and the rigid component connected to the fork tube comprises a stop sleeve, the barrel housing having an integral stop collar of which each of a pair of lateral surfaces lying in a plane perpendicular to the axis of the steering head tube co-operates with a respective stop formed by the end of a circumferential groove in the stop sleeve.
2. A steering lock as claimed in claim 1, in which the barrel housing is connected to the lock housing by a welding pedestal, with which the stop collar is integrally formed.
3. A steering lock as claimed in claim 1 or claim 2, in which the detent bolt is co-axial with the locking barrel and passes through the stop collar, with at least one bolt-receiving opening being provided in the circumferential groove in the stop collar.
4. A steering lock as claimed in any preceding claim, in which the detent bolt comes into alignment with a bolt-receiving opening when the stop collar is in contact with either stop.
5. A steering lock as claimed in any preceding claim, in which two bolt-receiving holes in the stop sleeve are directed radially, and the angle between them corresponds to the desired steering range of the bicycle.

6. A steering lock as claimed in claim 5, in which the angle lies in a range between  $70^{\circ}$  and  $120^{\circ}$ .

7. A steering lock as claimed in any preceding claim, in which an upper steering head bearing is integrated into the steering lock, and is adjusted with the steering lock on assembly.

8. A steering lock as claimed in claim 7, in which the upper steering head bearing in a shoulder bearing, and on assembly its clearance is set and it is then locked by means of a nut and support washer connected to the fork tube against relative rotation.

9. A steering lock as claimed in any preceding claim, in which the lock housing is located round the steering head tube, with at least one radially inwardly extending projection on the lock housing engaging in a corresponding receiving groove on the end of the steering head tube, such that the axial overlap between the steering head tube and the lock housing limits the axial depth of the receiving groove on the end of the steering head tube.

10. A steering lock for a bicycle of the kind set forth substantially as described herein with reference to and as illustrated in the accompanying drawings.

Search Examiner  
MR R BROWN

**Date of completion of Search**  
**29 NOVEMBER 1994**

Documents considered relevant following a search in respect of Claims :-  
All

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii)

<b>X:</b>	Document indicating lack of novelty or of inventive step.	<b>P:</b>	Document published on or after the declared priority date but before the filing date of the present application.
<b>Y:</b>	Document indicating lack of inventive step if combined with one or more other documents of the same category.	<b>E:</b>	Patent document published on or after, but with priority date earlier than, the filing date of the present application.
<b>A:</b>	Document indicating technological background and/or state of the art.	<b>&amp;:</b>	Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages	Relevant to claim(s)
<p>GB 0669144</p>	<p>(HERCULES) see Figures 1 and 4</p>	<p>RF05705</p>